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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/696,548  | 10/30/2003  | Eric Benazzi         | PET-2103            | 7843             |
| 23599   | 7590        | 04/24/2006           | EXAMINER            |                  |
| MILLEN, WHITE, ZELANO & BRANIGAN, P.C.<br>2200 CLARENDON BLVD.<br>SUITE 1400<br>ARLINGTON, VA 22201 |             |                      | SINGH, PREM C       |                  |
|   |             |                      | ART UNIT            | PAPER NUMBER     |
|   |             |                      | 1764                |                  |

DATE MAILED: 04/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/696,548

Applicant(s)

BENAZZI ET AL.

Examiner

Prem C. Singh

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☒ Claim(s) 1 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Specification*

Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract should be in one paragraph between 50 and 150 words.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benazzi et al (WO 01/81508 A1) in view of Baker et al (US Patent 5,951,848) and further in view of Akizuki et al (US Patent 4,837,193).

Benazzi invention discloses a scheme of processes for the joint production of very high quality middle distillates (gas oils in particular). The oils that are obtained have a high viscosity index (VI), a low content of aromatic compounds, low volatility, good UV stability and a low pour point starting from petroleum fractions that have a boiling point of greater than 340°C (US Equivalent: 6,884,339: Column 1, lines 56-62). More specifically, the invention relates to a process for the production of high quality oils and optionally high quality middle distillates from a hydrocarbon feed stock including at least 20% of end volume above 340°C, a process that comprises the following steps:

(a) Hydrotreatment carried out at a temperature of 330-450°C, under a pressure of 5-25 MPa, with a volumetric flow rate of 0.1- 6 h<sup>-1</sup>, in the presence of hydrogen in the hydrogen/hydrocarbon volumetric ratio of 100-2000, and in the presence of an amorphous catalyst that comprises at least one metal of group VIII and at least one metal of group VI B,

(b) Hydrocracking without intermediate separation of the effluent that is obtained at the end of the hydrotreatment,

(c) Atmospheric distillation of the effluent that is obtained at the end of hydrocracking to separate the gases from the liquid,

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(d) Catalytic dewaxing of at least one liquid fraction that is obtained by atmospheric distillation and that contains compounds with a boiling point higher than 340°C, dewaxing at a temperature of 200-500°C, under a total pressure of 1-25 MPa, with an hourly volumetric flow rate of 0.05 – 100 h<sup>-1</sup>, in the presence of 50-2000 liters of hydrogen/liter of feedstock, in the presence of a catalyst that comprises a zeolite that is selected from the group that is formed by zeolites ZSM-48, EU-12, EU-11 and ZBM-30,

(e) The dewaxed effluent is directly subjected to a hydrofinishing treatment that is carried out at a temperature of 180 – 400°C, total pressure of 1-25 MPa with an hourly volumetric flow rate of 0.05-100 h<sup>-1</sup>, in the presence of 50-2000 liters of hydrogen per liter of feedstock, and in the presence of an amorphous catalyst for the hydrogenation of aromatic compounds, comprising at least one metal that is selected from the group of metals of group VIII and metals of group VI B,

(f) The effluent that is obtained from the hydrofinishing treatment is subjected to a distillation stage that comprises an atmospheric distillation and a vacuum distillation.

(US Equivalent: 6,884,339: Column 2, lines 1-50).

Benazzi invention further discloses that the feedstock can be, for example, LCO (light cycle oils), vacuum distillates that are obtained from direct distillation of crude or conversion units such as the FCC, coker or visbreaking, or that come from aromatic compound extraction units or that come from desulfurization or hydroconversion of RAT (atmospheric residues) and/or RSV (vacuum residues), or else the feedstocks can be deasphalted oil or else any mixture of the above-cited feedstocks (Column 3, lines 3-10). The zeolite is advantageously selected from the group that is formed by the Y-

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zeolite (FAU structural type, faujasite) and the beta zeolite (BEA structure type) (US Equivalent: 6,884,339: Column 4, lines 66-67; column 5, line 1). The zeolite optionally can be doped with metal elements such as, for example, the metals of the family of rare earths or noble or non-noble metals of group VIII such as Pt, Pd, Rh, Ru, Ir, Fe (US Equivalent: 6,884,339: Column 5, lines 8-12). These two stages (a) and (b) can be carried out on the two types of catalysts in (two or more) different reactors, or preferably on at least two catalyst beds that are installed in the same reactor (US Equivalent: 6,884,339: Column 5, lines 54-57). It is advantageously possible to distill at atmospheric pressure to obtain several fractions (gasoline, kerosene, gas oil, for example), with a boiling point of at most 340°C and a fraction (called residue) with an initial boiling point of higher than 340°C (US Equivalent: 6,884,339: Column 5, lines 66-67; column 6, lines 1-3).

Benazzi invention also discloses that the fraction that contains the compounds that boil above 340°C, as defined above, obtained from the second stage and the atmospheric distillation is then subjected, at least partly and preferably totally, to a catalytic dewaxing stage in the presence of hydrogen and a hydrodewaxing catalyst comprising an acid function and a hydro-dehydrogenating metallic function and at least one matrix (US Equivalent: 6,884,339: Column 6, lines 66-67; column 7, lines 1-5). The acid function is ensured by at least one zeolite that is selected from the group that is formed by the ZSM-48, EU-2, EU-11, and ZBM-30 zeolites (US Equivalent: 6,884,339: Column 7, lines 8-10). The catalyst also comprises a hydro-dehydrogenating function that is ensured by for example, at least one element of group VIII and preferably at least

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one element that is in the group formed by platinum and palladium (Column 7, lines 23-26). The operating conditions under which the hydrodewaxing stage of the process of the invention operates are as follows: The reaction temperature is between 200 and 500°C, the pressure is between 0.1 and 25 MPa, the hourly volumetric flow rate (vvh expressed by volume of feedstock injected per unit of volume of catalyst and per hour) is between about 0.05 and about 50 h<sup>-1</sup> (Column 7, lines 63-67; column 8, lines 1-7). The hydrogen level that is used and expressed in liters of hydrogen per liter of feedstock is 50 and 2000 (Column 8, lines 11-12).

Benazzi invention further discloses that the effluent at the outlet of the catalytic hydrodewaxing stage is, as a whole and without intermediate distillation, sent to a hydrofinishing catalyst in the presence of hydrogen to carry out an intense hydrogenation of the aromatic compounds that degrade the stability of oils and distillates (US Equivalent: 6,884,339: Column 8, lines 36-40). The effluent at the outlet of the hydrofinishing stage is sent into the distillation train, which integrates an atmospheric distillation and a vacuum distillation (US Equivalent: 6,884,339: Column 9, lines 27-29).

Benazzi invention does not disclose the pretreatment (stage (a)) using a noble metal of group VIII catalyst.

Baker invention discloses a process for catalytically dewaxing a lubricant feedstock whereby the aging of the dewaxing catalyst and eventual line-out temperature



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are minimized (Column 3, lines 35-37). The feedstock is contacted in the presence of hydrogen with the catalyst system at a space velocity (based on the dewaxing catalyst volume) between 0.2 and 10 and in a temperature range between 450°F and 800°F. The catalyst system comprises a high activity hydrotreating catalyst operating upstream of a dewaxing catalyst, preferably (although not restricted to operating) in the same reactor vessel. The hydrotreating and dewaxing catalysts each preferably contain one or more noble metals with the dewaxing catalyst also containing constrained intermediate pore molecular sieve (Column 3, lines 39-50). Prior to dewaxing, crude fractions used to make lubricant stocks are generally subjected to one or more refining steps which remove low viscosity index components such as heteroatoms, aromatics, and polycyclic naphthenes. This upgrading step can be accomplished by solvent extraction, hydroprocessing, or a combination of the two steps (Column 4, lines 26-31). If hydrocracking is employed as a pretreatment step, an amorphous bifunctional catalyst is preferably used to promote the saturation and subsequent ring opening of the low quality aromatic components in the feed to produce hydrocracked products which are relatively more paraffinic (Column 4, lines 60-64). The instant invention is more robust for dewaxing feeds with moderate levels of nitrogen and sulfur and is suitable for dewaxing raffinates although raffinates having less than 5000 ppmw sulfur and 50 ppmw nitrogen are preferred (Column 7, lines 52-56). Since it is preferred to practice this invention in a single reactor vessel, the hydrotreating catalyst must have sufficient activity at the temperature at which the dewaxing catalyst operates. Therefore, hydrotreating catalyst containing noble metals such as platinum or palladium are

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preferred in this invention (Column 8, lines 46-51). The amount of noble metals present on the catalyst can range from 0.1% to 5 wt % (Column 8, lines 56-57). The metal component of the catalyst is generally supported on a porous, amorphous metal oxide support. A silica-alumina combination with low acid activity is acceptable (Column 8, lines 63-66). The second catalyst is a selective dewaxing catalyst based on a constrained intermediate pore crystalline material, such as a zeolite or a silica-alumino-phosphate. ZSM-23 is the preferred molecular sieve for this purpose although other highly shape-selective zeolites such as ZSM-22, ZSM-48, ZSM-50, ZSM-35, SAPO-11, SAPO-31, and SAPO-41 may be used (Column 9, lines 13-24). The dewaxing catalyst used in this invention include a metal hydrogenation-dehydrogenation component which is preferably a noble metal (Column 9, lines 45-47). Both catalysts may be in the same fixed bed reactor or the hydrotreating catalyst may be upstream in a separated bed. A single reactor vessel is preferred. Conditions will therefore be of elevated temperature and pressure with hydrogen, typically at temperatures from 250-500°C, pressures extent up to 3000 psi (20.7 MPa), space velocities extend from 0.1 to 10 h<sup>-1</sup> (Column 9, line 67; column 10, lines 1-14).

It is to be noted that the "hydrotreating" referred to by Baker invention is the same as "pretreatment" referred to by the applicant.

Baker invention does not disclose the size distribution of pores of the catalyst.

Akizuki invention discloses that accordingly, in this invention, the silica content of a silica/alumina or silica/alumina-containing carrier is generally within the range of 2 to 35 % by weight (Column 4, lines 39-41). A catalyst having following properties with respect to pore size distribution can exhibit an extremely marked desulfurization effect:

(1) the volume of pores having a diameter in the range of 30 to 100 Angstroms is at least 70 percent, preferably more than 80%, and most preferably more than 90% of the volume of pores having a diameter in the range of 0 to 150 Angstroms;

(2) the volume of pores having a diameter in the range of 100 to 300 Angstroms is less than about 30%, and preferably less than about 20% of the volume of pores having a diameter in the range of 0 to 300 Angstroms (the pore volumes in (1) and (2) being determined according to the nitrogen adsorption method);

(3) the volume of pores having a diameter in the range of 150 to 150,000 Angstroms as measured by the mercury porosimetry is about 0.005 to 0.25 ml/g, preferably 0.01 to 0.20 ml/g, and most preferably, 0.02 to 0.10 ml/g;

(4) the volume of pores having a diameter in the range of 300 to 15,000 Angstroms as measured by the mercury porosimetry is less than 0.05 ml/g, preferably less than 0.03 ml/g, and most preferably less than 0.02 ml/g;

(5) the volume of pores having a diameter in the range of 150 to 2,000 Angstroms as measured by mercury porosimetry is less than 0.01 ml/g;

(6) the volume of pores having a diameter in the range of 0 to 600 Angstroms as measured by the nitrogen adsorption method is in the range of about 0.3 to 0.7 ml/g, preferably 0.40 to 0.65 ml/g, and most preferably 0.45 to 0.60 ml/g; and

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(7) the specific surface area is in the range from about 200 to 400 m<sup>2</sup>/g, preferably 230 to 350 m<sup>2</sup>/g, and most preferably 250 to 330 m<sup>2</sup>/g.

Further the catalyst has a total pore volume of about 0.4 to 0.9 ml/g, bulk density of about 0.5 to 1.0 g/ml, and side crushing strength of about 0.8 to 3.5 kg/mm

(Column 4, lines 49-68; column 5, lines 1-19).

Akizuki invention further discloses the reason why the pore size distribution of the catalyst disclosed in this invention exerts a marked effect on the activity and activity maintenance in the hydrodesulfurization of hydrocarbon oil (Column 6, lines 23-26). Silica is suitable for controlling the solid acidity of the catalyst, so that it may be used in an amount in the range of about 2 to 35 wt% based on the carrier (Column 6, lines 49-51). Suitable alumina includes gamma-alumina, chi-alumina, eta-alumina, and a mixture thereof, though any alumina that can provide the pore size distribution and the properties disclosed in this invention can be used desirably (Column 6, lines 65-68). For example, a residual oil containing about 30 to 100 % by weight of a hydrocarbon component having an atmospheric boiling point higher than about 480°C usually contains about 1 to 10% by weight of sulfur, about 0.1 to 1 % by weight of nitrogen, about 10 to 1,000 ppm of metals, and about 1% by weight of Conradson carbon residue (Column 11, lines 18-25).

Although Akizuki invention does not disclose X-ray diffraction and fluorescence, but it is known to those skilled in the art that the catalyst characterization is done by standard X-ray diffraction and fluorescence techniques.

It is to be noted that Benazzi invention takes the feed to the HDS/HDN step followed by a hydrocracking step and finally to a dewaxing step. Baker invention passes the feed from a HDS/HDN step to a hydrotreating unit (which is equivalent to the applicant's pretreatment step) and then to the dewaxing step. It is known to those skilled in the art that this step is typically known as isomerization step which converts the straight chain normal paraffins to branched chain and iso paraffins and thus reducing the paraffin wax. Thus, it would have been obvious to one skilled in the art at the time the invention was made to combine the inventions of Benazzi and Baker and provide an additional step of hydrotreating in the Benazzi process to reduce the wax from the feed not only in the dewaxing step but also in the hydrotreating step and thus enhancing the overall dewaxing operation.

It would have been obvious to use a catalyst in the pretreatment step with claimed pore distribution for proper activity and maintenance of activity during the hydrodesulfurization process.

Although Akizuki invention does not disclose V2, V3, and V6; and the ratio of  $(D_{\text{mean}} - 30 \text{ \AA})$  and  $(D_{\text{mean}} + 30 \text{ \AA})$ , since the catalyst used by Akiuki catalyst is similar to the applicant's it inherently has similar pore size distribution and therefore, similar V2, V3, and V6 values.

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Although Benazzi invention does not disclose the acidity measurement by IR tracking of thermodesorption of pyridine, it is known to those skilled in the art that the acidity for catalysts can be measured by standard techniques. It would have been obvious to measure acidity by any technique and use B/L ratio as claimed because the catalyst by the applicant has the same elements as disclosed by Benazzi, Baker, and Akizuki inventions.

Benazzi, Baker, and Akizuki inventions do not disclose silico-aluminum zones.

It would have been obvious to modify Benazzi, Baker, and Akizuki inventions and use Si/Al ratio as claimed because both catalysts are similar and expected to give similar ratios of Si/Al.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wittenbrink et al, US Patent 5,965,475.

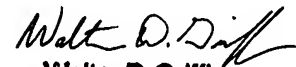
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 6:30 AM-3:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ps/041706

  
Walter D. Griffin  
Primary Examiner